PQM II
POWER QUALITY METER

Power Quality and Energy Cost Management

KEY BENEFITS
- Power quality metering with waveform capture and historical data logging
- Easy to program and use with keypad and large illuminated 40 character display
- Multiple communication ports for integration with DCS and SCADA systems
- Supports DNP 3.0 and Modbus protocols
- Digital and analog I/Os for control and alarms
- Voltage disturbance recording capability for electrical sag and swell events.

APPLICATIONS
- Metering of distribution feeders, transformers, generators, capacitor banks and motors
- Medium and low voltage systems
- Commercial, industrial, utility
- Flexible control for demand load shedding, power factor, etc.

FEATURES

Monitoring and Metering
- Ia Ib Ic In
- Va Vb Vc Vab Vbc Vca
- V I unbalance
- True PF crest and K factor
- Hz W var VA
- Wh varh VAh W cost
- Demand: A W var VA
- Harmonic analysis through 63rd with THD and TIF
- Event recorder - 150 events
- Waveform capture
- Data logger - 98,000 events
- Voltage Disturbance Recorder (VDR) - 500 events

Communications
- Front RS232 serial port (1,200 to 19,200 bps)
- Two rear RS485 serial ports with ModBus and DNP 3.0 protocol
- Ethernet connectivity provided by MultiNet
- EnerVista™ software is provided for setup and monitoring functions
- External dial-in modem capabilities

Protection & Control
- Load shedding
- Power factor control
- Pulse input totalizing
Introduction
GE Multilin has set a new standard in metering technology with the introduction of the PQM II. This meter, designed on the latest industry specifications, provides accurate and reliable three-phase power metering with an optional Ethernet and fiber communications module in a small and modern package. The PQM II can be used for a variety of applications including metering of distribution feeders, transformers, generators and motors.

Robust Metering and Power Quality Capabilities in One Package
The PQM II is an ideal choice when continuous monitoring of a three phase system is required. It provides metering for current, voltage, real and reactive power, energy use, cost of power, power factor and frequency. Waveform capture and Voltage Disturbance Recorder continuously monitors power quality. Programmable setpoints and 4 assignable output relays allow control functions to be added for specific applications.

Communications Made Easy
Integrate process, instrumentation and electrical requirements in a plant automation system by connecting PQM II meters to a DCS or SCADA system. Meter provides multiple communication ports that can provide data simultaneously to multiple masters such as SCADA, DCS, BMS etc. Meter supports both ModBus and DNP 3.0 protocol. A computer running EnerVista™ software can change system setpoints, monitor values, status and alarms. Continuous monitoring minimizes process downtime by immediately identifying potential problems due to faults or changes.

Industry leading software makes setup simple
The PQM II comes complete with EnerVista™ GE Multilin’s suite of software tools for managing the entire lifecycle implementation of the PQM II. EnerVista™ contains all of the tools for setting up and configuring your PQM II in minutes via RS232, RS485, external modem or Ethernet LAN.

Ethernet capability
With the optional Multinet module, users can add Ethernet capability to their meter. Multinet is an Ethernet communications module that allows connection of up to 30 ModBus devices, providing ModBus TCP/IP communications for these devices over Ethernet. This allows connection to Fiber Optic LAN and WAN systems for remote access to data on the PQM II.

Standard Features
The PQM II provides continuous monitoring of a three-phase system. It provides metering of current, voltage, real and reactive power, energy use, cost of power, power factor and frequency. Ethernet communications are available through the optional Multinet module.

Metering
PQM II is a true RMS meter with 0.2% accuracy for voltage and currents. The PQM II provides advanced features for monitoring and metering which include:

- Ia Ib Ic In
- Va Vb Vc Vab Vbc Vca
- V I unbalance
- True PF crest and K factor

- Hz W var VA
- Wh varh VAh W cost
- Demand: A W var VA

Keypad and illuminated 40 character display provides local setpoint settings and monitoring of values and status.

Mounting Versatility
PQM II panel mount with display, offers an easy local interface. Standard models have RS485 communications for programming and monitoring. Users can replace expensive additional devices by adding the CONTROL, TRANSDUCER and POWER analysis options to the PQM II as required.

Alarms
Any of the assignable outputs may be used to trigger an alarm for specific applications. Simple alarm messages provide easy notification.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>overcurrent</td>
<td>motors/transformers</td>
</tr>
<tr>
<td>undercurrent</td>
<td>pumps/compressors</td>
</tr>
<tr>
<td>neutral current</td>
<td>leakage/unbalance</td>
</tr>
<tr>
<td>current unbalance</td>
<td>motors</td>
</tr>
<tr>
<td>overvoltage</td>
<td>equipment protection</td>
</tr>
<tr>
<td>undervoltage</td>
<td>motors/load transfer</td>
</tr>
<tr>
<td>phase sequence</td>
<td>pumps/equipment</td>
</tr>
<tr>
<td>overfrequency</td>
<td>generators</td>
</tr>
<tr>
<td>underfrequency</td>
<td>load shedding</td>
</tr>
<tr>
<td>power factor</td>
<td>capacitor banks</td>
</tr>
<tr>
<td>switch input</td>
<td>process control</td>
</tr>
</tbody>
</table>

Connect up to 32 ModBus devices to your Ethernet network
Communications
Integrate process, instrumentation and electrical requirements in a plant automation system by connecting PQM II meters to a DCS or SCADA system. Initially PQM II meters can be used as stand-alone units. Open architecture allows connection to other ModBus® compatible devices on the same communication link. At a later stage PQM II can be integrated in a complete plant wide system for overall process monitoring and control. The standard PQM II comes complete with a rear RS485 and front RS232 port. RS232 port can be used for data collection, printing reports or problem analysis without disturbing the main RS485 communication interface at rear. The standard meter provides:

- RS485 ModBus® 1,200 to 19,200-bps
- DNP 3.0 Level 2 Protocol
- Mini RTU SCADA system component
- Measure actual values
- Read status
- Issue control commands
- Load all setpoints from a file
- Change individual setpoints

A computer running EnerVista™ software can change system setpoints, monitor values, status and alarms. Continuous monitoring minimizes process downtime by immediately identifying potential problems due to faults or changes.

Future Expansion
The PQM II uses non-volatile flash memory for firmware storage. This allows future product upgrades to be loaded via the serial port. Upgrades can also be downloaded from the GE Multilin website.

Options
There are a variety of options available to the user, allowing a range of custom configurations:

Transducer
Four Analog Outputs: Four isolated analog outputs can be used to replace eight analog transducers. Output signals can be selected from any of the measured parameters for direct interface to a PLC or other devices.

Analog Input: PQM II meter can accept two analog inputs from external devices. Meter can be programmed to activate a control relay based on analog input from transducers (temperature, level etc.)

Communications
Second Rear Comm Port: An additional rear RS485 comm port is provided for simultaneous monitoring by process, instrument, electrical or maintenance personnel.

Control
Three output relays and four inputs allow measured parameters from the standard PQM II to be combined with setpoints and I/Os for control applications. With the control option, three output relays and four switch inputs are added along with programmable setpoints to make a mini RTU. Output relays can also be controlled via the communication port or assigned to different setpoints for custom programming to accommodate many applications such as:

- Undercurrent alarm for pumps
- Over and undervoltage for generators
- Unbalance alarm for rotating machines
- Dual level power factor for capacitor bank switching
- Underfrequency/demand output for load shedding resulting in power cost savings
- kWh, kvarh and kVAh pulse output for PLC interface

Power Analysis
Data Logger (Trending): Trending is useful as a troubleshooting aid when a problem is detected. Measured values can be selected and plotted with a programmable sampling rate to suit the time interval of interest. The generated chart recorder screen can be printed or
exported to other programs for report writing.

**Harmonic Analysis:** Non linear loads such as variable speed drives, computers and electronic ballasts can cause harmonics which may lead to problems such as nuisance breaker tripping, telephone interference, transformer, capacitor or motor overheating. Harmonic analysis can be used for fault diagnosis such as detecting undersized neutral wiring, need for a harmonic rated transformer, or effectiveness of harmonic filters. Details of the harmonic spectrum are useful and available with the power analysis option.

**Voltage Disturbance Recorder (VDR)**
The Voltage Disturbance Recorder (VDR) function adds to the PQM II the ability to monitor and record Sag and Swell disturbances. It can record up to 500 sag/swell events for all voltages simultaneously.

**Waveform Capture:** Voltage and current waveforms can be captured and displayed on a PC using the EnerVista™ program supplied with the PQM II or using third party software. Distorted peaks or notches from SCR switching provide clues for taking corrective action.

**Event Recorder:** Alarms, setpoint triggers, input and output events can be stored in a 150 event record and time and date stamped by the internal clock. This is useful for diagnosing problems and system activity. Minimum and maximum values are also continuously updated and time stamped.

**Trace Memory:** The PQM II can be configured to record a maximum of 36 cycles of data on all voltage and current inputs based on overvoltage, undervoltage, overcurrent or switch input state change.

---

**EnerVista™ Software**

**EnerVista™ Launchpad**

EnerVista™ Launchpad is a powerful software package that provides users with all of the setup and support tools needed for configuring and maintaining GE Multilin Products. Launchpad allows configuration of devices in real-time by communicating using RS232, RS485, Ethernet, or modem connections.

The intuitive user interface makes it simple to enter setpoints, read metered values, monitor status and evaluate power quality. Powerful troubleshooting features make it easy to retrieve and view voltage & current waveshapes and harmonic analysis. This vital information can help provide early warning of problems and prevent equipment damage or nuisance breaker tripping.

---

**EnerVista Launchpad PQM II Setup and Analysis**
PQM II setup program contains many tools and reports that simplify device configuration and allows viewing of power system events.

---

**Simplified IED Setup**

**Record trends of measured parameters over time**

**Voltage and current waveforms provide valuable insights into system problems**
Included in Launchpad is a document archiving and management system that ensures critical documentation is up-to-date and available when needed by automatically checking for and downloading new versions of manuals, applications notes, specifications, and service bulletins.

**Viewpoint Monitoring**

Viewpoint Monitoring is a simple-to-use, full-featured monitoring and data recording software package for small systems. Viewpoint Monitoring provides a complete HMI package that instantly puts critical real-time device data on your PC through pre-configured graphical screens with the following functionality:

- Plug-&-Play Device Monitoring
- System Single-Line Monitoring & Control
- Annunciator Alarm Screens
- Trending Reports
- Automatic Event Retrieval
- Automatic Waveform Retrieval

**EnerVista™ Integrator**

EnerVista™ Integrator is a toolkit that allows seamless integration of GE Multilin devices into new or existing automation systems by sending GE device data to HMI, DCS, and SCADA systems. Included in EnerVista Integrator is:

- OPC/DDE Server
- GE Multilin Drivers
- Automatic Event Retrieval
- Automatic Waveform Retrieval

**EnerVista Viewpoint Monitoring Plug-and-Play Screens**

Viewpoint Monitoring PQM II real-time overview screen for detailed device status

Viewpoint Monitoring PQM II analysis screen for detailed power quality information
## Technical Specifications

### MONITORING

**UNDERVOLTAGE MONITORING**
- **Required voltage:** 20 V applied
- **Dropout level:** 0.99 in steps of 0.01 x VT
- **Phases:** 0.5 – 600.0 in steps of 0.5 sec
- **Level accuracy:** ±0.2% of full scale
- **Timing accuracy:** ±0.1 sec

**OVERVOLTAGE MONITORING**
- **Pickup level:** 1.01 – 1.25 in steps of 0.01 x VT
- **Time delay:** 0.5 – 600.0 in steps of 0.5 sec
- **Level accuracy:** ±0.2% of full scale
- **Timing accuracy:** ±0.1 sec

**UNDERFREQUENCY MONITORING**
- **Required voltage:** 20 V applied
- **Pickup level:** 20 – 70.00 Hz in steps of 0.01 Hz
- **Time delay:** 0.1 – 10.0 in steps of 0.1 sec
- **Level accuracy:** ±0.2 Hz
- **Timing accuracy:** ±3 cycles

**OVERFREQUENCY MONITORING**
- **Required voltage:** 20 V applied
- **Pickup level:** 0.50 lag – 0.50 lead in steps of 0.01
- **Time delay:** 0.5 – 600.0 in steps of 0.5 sec
- **Level accuracy:** ±0.2 Hz

**POWER FACTOR MONITORING**
- **Required voltage:** 20 V applied
- **Pickup level:** 0.50 lag – 0.50 lead in steps of 0.01
- **Time delay:** 0.5 – 600.0 in steps of 0.5 sec
- **Level accuracy:** ±0.2 Hz
- **Timing accuracy:** ±3 cycles

### SAMPLING MODES

<table>
<thead>
<tr>
<th>Sample Rate</th>
<th>Inputs Sampled</th>
<th>Duration (Cycle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>Rate (A)</td>
<td>Time (A)</td>
</tr>
<tr>
<td>256 samples</td>
<td>5 kHz</td>
<td>1</td>
</tr>
</tbody>
</table>

### DEMAND MONITORING
- **Measured values:** Phase A/B/C/N current (A) 5% of full load (1 A), 3% of full load (10 A), 3% of apparent power (kVA)
- **Measurement type:** Active, reactive, apparent power (kVA)
- **Input:** Thermal exponential, 5 - 60 min, step of 1 min
- **Interval:** 5 - 600 sec
- **Pickup level:** 0.1 – 7.000 kW in steps of 1 kW
- **Load:** 0.1 – 6500 kW
- **Accuracy:** ±0.2% of full scale
- **Timing:** ±0.1 sec

### OVERCURRENT MONITORING
- **COM3 COM2 Type:** RS485, 2-wire, half duplex, isolated
- **Frequency:** 250 Hz
- **Level accuracy:** ±0.5 Hz
- **Voltage accuracy:** ±0.25 V
- **Contact material:** Nickel-alloy
- **Checking:** 10 minutes

### ENVIRONMENTAL
- **Operating Temperature:** -10°C to +60°C
- **Humidity:** 95% non-condensing at 55°C
- **Pollution Degree:** 2
- **Ingress Protection:** IP40 (front) IP20 (back)

### PACKAGING
- **Shipping box:** 8 1/2” x 6” x 6”
- **Weight:** 5 lbs (2.3 kg)

### OUTPUTS

**ANALOG OUTPUTS**
- **Accuracy:** ±1% of full scale
- **RMS values:** 0 – 1 mA (15 Option) 4 – 20 mA (20 Option)

**VOLTAGE LEVELS**
- **Linearity:** ±0.1 V
- **Accuracy:** ±0.4% of pick
- **Frequency:** ±0.2 Hz

**Power Line Impedance:** ±0.5 – 1 m Ohm

**Contact material:** Silver alloy

### PULSE OUTPUT
- **Parameters:** ±0.0 – 100.0 ms
- **Interval:** 1 – 65000 in steps of 1
- **Pulse width:** 100 – 2000 ms in steps of 10 ms
- **Min pulse interval:** 600 ms

### LIFE TESTS
- **Dielectric voltage withstand:** EN60285-5
- **Impulse voltage withstand:** EN60285-5
- **Insulation resistance:** EN60285-5
- **Damped Oscillatory:** IEC61000-6-2 / IEC60285-5
- **Electric Discharge:** EN61000-4-2 / IEC60285-5
- **RF Immunity:** EN61000-4-3 / IEC60285-5
- **Fast Transient:** EN61000-4-4 / IEC60285-5
- **Disturbance:** EN61000-4-4 / IEC60285-5
- **Surge Immunity:** EN61000-4-5 / IEC60285-5
- **Conducted RF Immunity:** EN61000-4-6 / IEC60285-5
- **Electromagnetic Compatibility:** IEC61000-4-4
- **Rearward Emission:** CISPR11 / CISPR22
- **Shock & Bump:** IEC61000-2-1
- **Power Magnetic Immunity:** IEC61000-4-5
- **Vibration:** IEC61000-4-5
- **Impact:** IEC61000-4-5

### APPROVALS
- **ISO:** Manufactured to an ISO9001 registered program
- **UL508, UL1053, C22.2 No 14** EN60285-5, EN61000-6-2

---

Please refer to the Multibit PQM II Power Quality Meter Instruction Manual for complete technical specifications.
PQM II Dimensions

Ordering

<table>
<thead>
<tr>
<th>PQM II</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* * *</td>
<td>Basic unit with display, all current/voltage/power measurements, 1-RS485 comm port, 1 RS232 comm port</td>
</tr>
<tr>
<td>T0</td>
<td>Transducer option; 4 isolated analog outputs 0 – 20 mA and 4 – 20 mA, assignable to all measured parameters, 4 – 20 mA analog input, 2nd RS485 comm port</td>
</tr>
<tr>
<td>T1</td>
<td>Transducer option; 4 isolated analog outputs 0 – 1 mA, assignable to all measured parameters, 4 – 20 mA analog input, 2nd RS485 comm port</td>
</tr>
<tr>
<td>C</td>
<td>Control option; 3 additional programmable output relays (total of 4), 4-programmable switch inputs</td>
</tr>
<tr>
<td>A</td>
<td>Power analysis option; harmonic analysis, triggered trace memory waveform capture, event record, data logger, voltage disturbance recorder (VDR)</td>
</tr>
</tbody>
</table>

Modifications:
- MOD 501: 20 – 60 VDC/20 – 48 VAC standard
- MOD 502: 20 – 60 VDC/20 – 48 VAC (MOD 501)
- MOD 504: Removable terminal blocks
- MOD 525: Harsh Environments Conformal Coating

Control Power:
- 90 – 300 VDC/70 – 265 VAC standard
- 20 – 60 VDC/20 – 48 VAC (MOD 501)

Visit www.GEMultilin.com/PQM II to:
- View Guideform Specifications
- Download the instruction manual
- Review applications notes and support documents
- Buy a PQM II online

Accessories for the PQM II:
- Multilink Ethernet Switch
- Multinet
- Viewpoint Monitoring

ML1600-HI-A2-A2
Multinet-FE
VP-1

www.GEDigitalEnergy.com

PQM II Power Quality Meter